**Template | Unit Enhancement**

***ENGINEERING DESIGN***

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**Background Information**

**Instructional Materials Title: Sound**

**Publication Date: August 23rd,2013**

**Work Group Participants: Tiffany Evenstad, Jeannie Revello, Stephanie Chen, Erin Bell Date Developed: August 22nd and August 23rd, 2013**

**High Leverage Lesson (Title and Page Number): Sound Unit Lessons 15 and 16**

**Rationale**

· **Why we identified this particular lesson – It offers great opportunities to do engineering designs and they fit well with Engineering Design Content 3-5 ETS 1-1,1-2 and 1-3.**

**- Connections to NGSS and WA Science Standards**

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***Engineering* Lesson Enhancement**

**Overview**

· **Identification of where within the High Leverage Lesson to insert enhancement**

· **Key instructional strategies and tools needed**

**Part 1: Lesson Modifications to Lead Up to *Engineering Task***

After the Explore and Investigate part of lesson 15 (page 50 in Instructional Guide), students complete a self-assessment with the goal being that the self-assessment will lead to a redesign/optimization. Students are provided a redesign guide to facilitate their optimized instrument.

**Part 2: *Engineering* Learning Sequence**

1. **Show video or share a story of a scientist in an authentic situation (modeling optimization).**

**\*PBS show Fetch; IDEO- shopping cart**

1. **Analyze, label what scientist did in the video and link it to their redesign task. Refer to anchor chart of the engineering process (Define, Develop solutions, and Optimize). Define and discuss vocabulary words (criteria and constraints) and find examples from the video and link to anchor chart.**
2. Teacher models using the self-assessment, rubric and redesign guide with a teacher made “faulty” instrument.
3. Students complete self-assessment and then complete redesign guide, plan, diagram (formative assessment). See attached documents:
4. Students begin task of optimizing instruments.
5. Teacher share and post rubric criteria and explain to students they will turn in their self assessments.
6. Individual presentations in front of class and students ask questions (teacher assesses); invite other classes, families, and community members for a “gallery walk” or other type of celebration.

**Part 3-A: Engineering Task**

*Describe the Engineering Task that students will engage in.*

*The task is students will redesign their prototype using a systematic self-assessment tool. See Student Checklist.*

*Students will optimize their instruments based on their “redesign” following their checklist. See Student Checklist page 2 next step.*

**Part 3-B: Assessment Rubric**

**See attached Rubrics for Oral and Written Responses.**

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**Additional Information**

NOTES

· This lesson is focusing on the optimizing process. All the checklist and rubrics were design to tailor to students’ need to familiarize this part of the engineering process and get them to work collaboratively. This lesson will be conducted after the students have planned and design their prototypes after we set their constrains and criteria in the class.

- Resources: Videos and engineering stories that promote engineering process, especially in optimizing process and how engineers testing and repeating in revising their design is necessary. Parent volunteers and IAs may be needed to assist with materials on hand and assistance when students need. Prior to this lesson, we recommend teachers start saving cardboard boxes, soap boxes, toilet paper rolls, empty jars, strings, etc. which students might need to build their designs. Teachers need to make a flawed instrument to share with the students.

- Depending on the student populations, we recommend that the teacher be spending more time in scaffolding, sharing and modeling the idea of optimizing process. For example, more videos or engineering stories being shared in class prior to launch this lesson. And teacher modeling and explaining the usage of the checklist and rubrics may be necessary to get students to think about how to redesign and optimizing their plan repetitively.